

## E-Kalpin self-management effectiveness as haemodynamic predictor of hypertension patients during the covid-19 pandemic

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### Abstract

**Background:** The intervention program for preventing and controlling hypertension is a challenge for health workers, one of which is by helping individuals do self-management (Self-Care) to overcome hypertension, this can increase their self-confidence (Self-Efficacy) to live with chronic diseases. Self-management is an individual's ability to carry out self-care activities to maintain life, improve, and maintain individual health and well-being. E-Kalpin is a visual-based education developed to improve patients self-management in comorbid patients. Patients can use E-Kalpin as a medium that helps them in supervising and controlling blood pressure. This study aimed to see the effectiveness of E-Kalpin's self-management as a predictor of haemodynamics in patients with hypertension during the covid pandemic.

**Method:** This study used a quasi-experimental research design with a pretest posttest approach with a control group. The population in this study were all patients with hypertension in the Aur Duri Public Health Center working area with a sample group of 30 respondents. The researcher used the E-Kalpin media as a media instrument which was arranged in the form of a questionnaire to obtain information and data from respondents.

**Results:** This study resulted in a relationship between the use of the E-Kalpin application as a medium to assist them in supervising and controlling their illness. The results of the statistical test obtained a p-value of 0.018, meaning that at 5% alpha there was a significant difference in the average of the kalpin group and the control group. This means that the use of E-Kalpin can assist people with hypertension in their self-management thus it can be used as a haemodynamic predictor in daily activities.

**Conclusion:** Health workers can use E-Kalpin as an educational medium that helps people with hypertension to predict the hemodynamics of the body in controlling blood pressure. For further researches, it is recommended to examine various supporting factors or other variables that affect the use of E-Kalpin application media to assist patients in controlling blood pressure.

**Keywords:** E-Kalpin, hypertension, self-management

### Abstrak

**Latar Belakang:** Program intervensi pencegahan dan pengontrolan hipertensi merupakan tantangan tersendiri bagi tenaga kesehatan, salah satunya dengan cara membantu individu melakukan manajemen diri (*Self care*) mengatasi hipertensi, hal ini dapat meningkatkan kepercayaan diri (*Self Efficacy*) mereka untuk hidup dengan penyakit kronis. Manajemen diri adalah kemampuan individu dalam melakukan aktifitas perawatan diri untuk mempertahankan hidup, meningkatkan, dan memelihara kesehatan serta kesejahteraan individu. E-Kalpin merupakan salah satu edukasi berbasis visual yang dikembangkan untuk meningkatkan manajemen diri pasien pada penderita Comorbid. Penderita dapat menggunakan E-Kalpin sebagai media yang membantu mereka dalam mengontrol dan mengendalikan tekanan darah. Penelitian ini bertujuan melihat efektifitas manajemen diri E-Kalpin sebagai prekursor haemodinamika penderita hipertensi di masa pandemi covid.

**Metode:** menggunakan desain penelitian quasi eksperimen dengan pendekatan *pretest posttest with control group*. Populasi adalah seluruh penderita Hipertensi di Wilayah Kerja Puskesmas

Aur Duri dengan jumlah sampel 30 responden. Peneliti menggunakan media E-Kalpin sebagai media instrumen yang disusun dalam bentuk kuesioner untuk mendapatkan informasi dan data dari responden.

**Hasil:** Penelitian ini menghasilkan adanya hubungan penggunaan aplikasi E-Kalpin sebagai media membantu mereka dalam mengontrol dan mengendalikan penyakit yang dideritanya. Hasil uji statistik didapat p-value sebesar 0,018, berarti pada alpha 5% terlihat ada perbedaan yang signifikan rata-rata kelompok kalpin dengan kelompok kontrol. Hal berarti penggunaan E-Kalpin dapat membantu penderita hipertensi dalam manajemen diri mereka sehingga dapat digunakan sebagai prediktor hemodinamika dalam aktivitas sehari-hari.

**Kesimpulan:** Petugas kesehatan dapat menggunakan E-Kalpin sebagai media edukasi yang membantu penderita hipertensi memprediksikan haemodinamika tubuh dalam mengontrol tekanan darah. Bagi penelitian selanjutnya agar dapat meneliti berbagai faktor pendukung atau variabel lain yang mempengaruhi penggunaan media aplikasi E-Kalpin untuk membantu penderita dalam mengontrol tekanan darah.

**Kata kunci:** E-Kalpin, hipertensi, manajemen diri

## INTRODUCTION

Hypertension is one of the many public health problems in Indonesia. Hypertension is a big problem for people's health. Many people do not realize that they suffer from hypertension. This is because the symptoms are not real and in the early stages it has not caused serious problems in their health. Continuously high blood pressure in the long term can cause complications. Complications that can be caused include disturbances in brain tissue and blood vessels that can cause several diseases such as stroke, kidney failure, eyes, and even cause death. As many as 62% of stroke cases and 42% of heart attack cases that occur each year are complications of hypertension. The intervention program for preventing and controlling hypertension is a challenge for health workers, one of which is by helping individuals understand that hypertension is a condition that can be managed, this can increase their confidence to live with chronic diseases. Self-management is an individual's ability to carry out self-care activities to maintain life, improve, and maintain individual health as well as individual well-being (1,2,3).

According to NCDs case data at the Aur Duri Public Health Center UPTD in 2020, hypertension occupies the first position with 789 cases. Hypertension still occupies the largest number of cases of all reported NCDs. This disease is the main

priority for controlling NCDs at the Aur Duri Public Health Center, especially during the Covid-19 pandemic where there were several cases of death of comorbid patients infected with the Covid-19 virus (4).

In the preliminary research of this E-KALPIN, which contains the information about Hypertension illness, symptoms, food must be eaten, and the guideline of nursing administration of hypertension patients. This smart calendar was made with the purpose to remind the hypertension patients when to take medicine, doing physical activities in the form of sport, and what kind of food could be eaten. In the researching being conducted to date, E-KALPIN has been developed, each hypertension patient when using this tool could detect how their health condition is, until then the comorbid patients can use E-KALPIN as the media that assist them in controlling the disease they suffer and take decision if they must consult to doctor in the Health Service Center or at Community Health Center (Puskesmas).

E-Kalpin, is a visual-based education developed to improve patient self-management in Comorbid patients. This study is a development of Kaimuddin & Arvida (2021) research on E-Kalpin as a visual-based educational media where the results show that E-Kalpin has an effect in helping to increase self-efficacy in hypertensive patients, through

hypertension management education including diet, physical activity, smoking and stress management (5).

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Based on this background, this study was conducted which aimed to develop E-Kalpin media as a haemodynamic predictor for hypertensive patients, thus it is hoped that comorbid patients can use e-Kalpin as a medium that can assist them in supervising and controlling their disease.

## METHOD

This study used a quasi-experimental research design with a pretest posttest approach with a control group. The subjects were divided into two groups, namely the intervention group and the control group, all of which were tested before and after the procedure. The intervention group was given E-Kalpin as a method of self-management, while the control group did not receive E-Kalpin. The control group only received counseling from officers. The researcher found out the differences in achievement between the intervention group and the control group.

The hypotheses in this study are: there is an influence of the E-Kalpin intervention on self-management of hypertension sufferers and there is a difference in self-management between the intervention

group and the control group . The study was conducted in the Aur Duri Public Health Center Working Area.

The population of this study were outpatients who were recorded at the Aur Duri Public Health Center. The sample selection used a probability sampling technique, this method namely through random sampling in which the respondents were selected randomly. The prospective respondents were identified altogether with the nurse or staff of Community Health Center (Puskesmas) in order to fulfill the sample criteria which had been determined.

The characteristics of the sample are respondents aged > 20 years, willing to be used as research subjects, patients who have been diagnosed with stage 1 hypertension based on medical records at the Public Health Center, do not have hearing problems, can read and write, and patients who have received health education from doctors/nurses. The exclusion criteria determined that the respondent was not selected as a sample if the respondent was pregnant, had other comorbidities such as heart disease, stroke, kidney failure and liver disorders. The number of samples was calculated by the formula for the sample size of the average difference test for unpaired samples, the selected sample was 30 respondents who were divided into the intervention group and the control group. Prior to data collection, this study had passed the ethical review with Ethical Clearance letter number No. LB.02.06/2/01/2022.

This research was started when the patients stated their willingness to become respondents. The respondents are given explanations by the researcher about the purpose, benefit, and how the research procedure was conducted. The respondents stated their agreement by signing the informed consent which previously the researcher had convinced themselves that respondents understand the research procedure and conduct self management in accordance with E-KALPIN. The community health center staff

monitored the respondents during the activity. After two weeks, the researcher with the staff conducted self management measurement by using the application given.

The research instrument used was a Hypertension Self Management Behavior Questionnaire (HSMBQ). HSMBQ is a modification of the Hypertension Self Management Instrument developed by Lin et al. in their research in 2008 as well as the application of E-Kalpin. In self-management, E-Kalpin consists of 5 components, namely: self-control, body condition, health consultation, following recommendations, and monitoring blood pressure (6).

Validity test and reliability of HSMQ Questionnaire were conducted on hypertension patients who visited Pakuan Baru Community Health Center, Jambi City. In the amount of 15 participants aged 50-60 years old who were the patients of hypertension and actively came for medication at least in the last three months involved in this research. In the validity test, the result showed that out of 45 items of questions in the questionnaire, there were 8 items invalid and 42 other items were stated valid based on Pearson Correlation ( $> r_{table} 0,361; p < 0,05$ ).

Further, 42 items were valid. Each dimension was tested for its reliability in the significance level of 0,05 and the result of each dimension had the value of Cronbach's Alpha  $> 0,07$  with overall score 0,927 which showed that all dimensions in the questionnaire were reliable. The conclusion of this research showed that the questionnaire based on HSMQ was a valid and reliable instrument to measure Haemodynamic Predictor of Hypertension Patients during Covid 19 Pandemic.

The data processing included editing, coding, data entry, and data cleaning, then univariate and univariate data analysis were carried out using the t test. Data processing was started through editing namely rechecking the data completeness which had been filled out by respondents. After the data were completely collected, then coding and scoring were conducted

namely giving numeric code (number) on the respondents' answer choice which consisted of some categories, for scoring given score on the physical activity. After the data were collected in tabulating data, then data analysis through univariate and bivariate were conducted by using dependent t-test with significance level in the amount of 5%.

## RESULTS

### Univariate Analysis

#### 1. Characteristics of Respondents

Characteristics of respondents for the intervention group and control group identified in this study were age, gender, marital status, employment status. Analysis of the characteristics of respondents based on age can be seen in the table below.

**Table 1.** Distribution of Respondents Characteristics (Age, Gender, Marital Status, Employment Status) Patients with Hypertension in the Work Area of Aur Duri Public Health Center Jambi City in 2022

Characteristics	Intervention Group		Control Group	
	Freq	%	Freq	%
Age Group				
< 50 Years Old	4	26.7	2	13.3
50 – 59 Years Old	6	40	6	40
>60 Years Old	5	33.3	7	46.7
Gender				
Male				
Female	10	66.7	11	73.3
	5	33.3	4	26.7
Marriage Status				
Married	12	80	10	66.7
Widow	3	20	5	33.3
Employed	11	73.3	7	46.7
Unemployed	4	26.7	8	53.3

From the table it can be seen that each respondent's age group is not much different, but the intervention group is at least under 50 years old (13.3%). The number of male respondents is more than female respondents in each group. In general, the status of the respondents is married. In the intervention group, most of

the respondents worked, while in the control group, the number of respondents who worked was almost the same as respondents who did not work.

## 2. Respondents Self Management

The results of the univariate analysis of E-Kalpin self-management can be seen in table 2.

**Table 2.** Distribution of Respondents Based on E-Kalpin Self Management

Self Management	Intervention		Control	
	Before	After	Before	After
Bad	10	3	11	9
Good	5	12	4	6
Total	15	15	15	15

In the intervention group, previously there were 10 people (66%) who had poor self-management and after using E-Kalpin it decreased to 3 people (20%) who had poor self-management. In the control group, 11 people (73%) had poor self-management before the action and after the action it decreased to 9 people (60%). This study assessed 5 indicators of E-Kalpin self-management of hypertension patients, namely: self-control, body condition, health consultation, following recommendations, monitor blood pressure.

### Bivariate Analysis

Bivariate analysis of different groups was performed using independent t-test to determine differences in the decrease in self-management of patients with hypertension in the intervention group and the control group. Previously, a normality test was carried out where the results of the ratio of skewness and standard error were:  $1.055/0.580 = 0.81$  (still below 2), thus the data were considered normally distributed. Therefore, for bivariate analysis, independent t test can be used.

Independent t test results can be seen in table 3.

**Table 3.** Bivariate Analysis of MAP Values of Intervention and Control Group

	Mean	SD	Std E	N	P value
Kalpin	103.93	3.515	0.907	15	0.018
Control	109.07	7.086	1.830	15	

The average self-management of respondents who received E-Kalpin treatment was 103.93 with a standard deviation of 3.515. Meanwhile, the control group had an average self-management of 109.07 with a standard deviation of 7.086. The results of the statistical test obtained a p-value of 0.018, meaning that at 5% alpha there was a significant difference in the average of the kalpin group and the control group. This means that the use of E-Kalpin can assist people with hypertension in managing themselves thus it can be used as a predictor of haemodynamics in daily activities.

## DISCUSSION

### Self-Management of Hypertension Patients

The results of the analysis on respondents showed that almost all respondents who have poor self-management stated that they were unable to reduce fatty and sodium foods. Uncontrolled blood pressure in respondents was due to not having a good diet pattern, most of the respondents could not avoid the habit of consuming saturated fat, because they were used to foods that contain saturated fat. The habit of consuming fried foods, thick coconut milk, beef, brain, and offal have risk factors that are proven to be associated with the incidence of hypertension. The habit of often consuming saturated fat is closely related to increasing body weight which is at risk of hypertension.

The habit of consuming salt and fat should be reduced. Consumption of foods high in salt and fat has a significant influence on increasing blood pressure. Patients who eat foods high in salt and fat have a risk of increasing blood pressure 7.429 times greater than patients who do



not eat foods high in salt and fat. This is in line with the results of previous studies which stated that there was a significant relationship between foods high in salt and fat and an increase in blood pressure. In this study, it is related to increased body weight which is at risk for hypertension.

Hypertension according to WHO data in 2015 showed that around 1.13 billion people in the world suffer from hypertension, which means that every 1 in 3 people in the world is diagnosed with hypertension. The number of people with hypertension in the world continues to increase every year. It is estimated that in 2025 there will be 1.5 billion people affected by hypertension and every year 9.4 million people die from hypertension and complications. The incidence of hypertension is more common in the elderly compared to the younger age group (7).

High-fat consumption patterns can be at high risk for the incidence of hypertension. Excessive consumption of saturated fat can cause impaired function of vascular endothelial cells. This endothelial cell damage then causes a decrease in the ability to vasodilate blood vessel walls, resulting in an increase in blood pressure (8).

From the results of the study, it was found that respondents' self-management was based on body condition. Respondents sometimes did not know the signs and symptoms of high blood pressure, thus they did not control the signs and symptoms of high blood pressure, out of 30 respondents only 11 (37%) respondents realized it. Respondents mostly ignore signs of increased blood pressure such as pain/stiffness in the neck or pain and staggering. Respondents also answered that they did not rest/sleep if they felt that their blood pressure was rising. A person who lacks sleep quality and quantity tends to be more susceptible to diseases, including heart attacks, anemia and high blood pressure. Hypertension is a symptom that is often found in the elderly and is a major risk factor for the incidence of cardiovascular disease (9).

Most of the respondents routinely ask health workers to get information about high blood pressure. Hypertension treatment compliance can also be caused by differences in knowledge about hypertension. Low level of education has an impact on low knowledge and it affects behavior. Even adequate education cannot guarantee the creation of good behavior, because according to Lehendroff and Tracy's theory, behavior is not only influenced by ability but also will. Information received by the community outside of their education also plays an important role in increasing knowledge. This shows the importance of discussing with a doctor or nurse when blood pressure is too high or low. With increasing knowledge, thus patients obtain information related to hypertension (10).

Not all hypertensive patients with low education have a low level of knowledge about hypertension and not all hypertensive patients with high education also have knowledge about high hypertension. Factors of information obtained from counseling and media can affect a person's knowledge (11).

Hypertension can be treated by obediently taking antihypertensive drugs. Compliance with taking medication can occur if the patient has the belief to recover, this belief is called self-efficacy. The majority of respondents routinely take hypertension medication and routinely control high blood pressure to health care workers. Providing information about drug administration can increase patients knowledge in the use of appropriate drugs and motivate patients to use drugs in accordance with the recommended use that has been given so as to improve patient compliance and can further increase the success of hypertension therapy that is being carried out, namely realizing stable blood pressure and preventing complications due to hypertension. (12,13).

From the results of the study, it was found that the respondents' self-management based on blood pressure monitoring before the action was in the

poor category as many as 21 people (70%). After taking action either using the E-Kalpin application or by interviewing, the number of respondents with self-management in the poor category decreased to 12 people. (40%). Compliance with controlling and checking blood pressure in the treatment of hypertension is important because hypertension is a disease that cannot be cured but must always be controlled thus complications that lead to death do not occur.

Hypertension is a disease that cannot be cured but must always be controlled thus there are no complications that lead to death, with compliance it can describe how the patient's behavior is in carrying out the rules in the treatment being undertaken and the education provided by health workers is (14).

### **The Differences in Self-Management of Hypertension Patients in the E-Kalpin Group and the Control Group**

Hypertension is a disease that requires long-term therapy, thus patient compliance is required in undergoing treatment to control blood pressure and reduce the risk of complications. The problem of adherence to treatment is one of the problems that arise in the treatment of hypertension. Support from health workers is needed by people with hypertension. This is because most of the information about disease and treatment is obtained from health workers. The support of health workers is not only in the form of providing information, but also in the form of good service and attitudes during the service process.

The results of this study indicate that the use of the E-Kalpin application and the use of questionnaires have a relationship in reducing blood pressure in patients with hypertension, but with the use of the E-Kalpin application it will increase the supervision and compliance of hypertension patients in managing their self-management thus the haemodynamics of the body becomes

good. If the haemodynamics is good, it will stabilize body functions and will directly lower blood pressure in hypertensive patients. The communication ability of health care workers with patients is the most dominant factor related to self-management in hypertensive patients (15).

Hypertension is a manifestation of hemodynamic balance disorders of the cardiovascular system whose pathophysiology cannot be explained by only one single mechanism. All definitions of hypertension are evidence-based or consensus-based or based on epidemiological meta-analyses. If the blood pressure is above the normal limit, it is said to be hypertension (12).

Excess sugar can have many consequences, including slowly damaging the sensitive blood vessels called capillaries. Damage to certain capillaries in the kidneys, can impair the ability of blood pressure to regulate into the kidneys and this causes high blood pressure. Hypertension itself also affects insulin secretion in the pancreas, which raises blood sugar levels. With this 'ability', the combined pressure of diabetes or hypertension is a system that can exacerbate the condition itself which causes these two diseases to tend to get worse over time. The relationship between diabetes and hypertension has a fairly close relationship, and it is possible that both of them are also at risk of causing other diseases, such as heart disease, kidney failure and other diseases. The risk of diabetes can also be influenced by family history, which allows a person to be exposed to a 3x higher risk. Diabetes mellitus is a metabolic disease with a large number of cases and is characterized by hyperglycemia conditions that occur due to abnormalities in insulin secretion, insulin action or both. One of the complications of diabetes is stroke caused by hypertension (15).

The use of E-Kalpin self-management can help patients to behave and have the confidence to recover, this belief is called self-efficacy. Self-management is important for hypertensive clients to

increase success in overcoming hypertension.

The mechanism of E-KALPIN usage is after the E-KALPIN Application installed in respondents' or users' smartphone then they are asked to register in the application by entering personal data such as name, age, occupation, gender, since when suffering of hypertension, consultant doctor, and nutrition expert if available. Afterwards, the respondents or users are directed to fill in self management containing the body condition, obey the orders, health consultation, and blood pressure monitoring. Each respondent or user is given five questions to answer. After all five questions are answered, then the conclusion of self management will appear in good condition or in bad condition. The measurement of this self management can only be conducted routinely once in a day.

Hypertension that is not treated immediately has an impact on the emergence of degenerative diseases, such as heart disease, kidney failure, and blood vessel disease. As a companion, hypertension can usually be found in several diseases such as diabetes mellitus and gout (16).

Hemodynamic monitoring is not a therapeutic measure but only provides information to clinicians and this information needs to be adjusted to the patient's clinical assessment in order to provide optimal treatment. The basis of hemodynamic monitoring is adequate tissue perfusion, such as a balance between oxygen supply and what is needed, maintaining nutrition, body temperature and electrochemical balance thus clinical manifestations of hemodynamic disorders in the form of impaired organ function which if not treated quickly and appropriately will fall into in multiple organ failure.

Based on the results of the study, E-Kalpin is very effective in helping and improving self-management of hypertension patients to monitor their body's hemodynamics thus they can find out the patient's body condition early and it can be treated or overcome, especially

during this covid pandemic. Patients with hypertension and diabetes are comorbid groups who are at risk of getting COVID-19 and can lead to death. Hypertension or high blood pressure that is not controlled in the long term risks causing organ damage, such as the heart and kidneys when exposed to COVID-19. The body that should be focused on fighting off virus infections ends up having to split up for the heart and kidneys that may be having problems. Uncontrolled diabetes makes the immune system decrease. Meanwhile, the immune system is needed to fight Corona infection.

## CONCLUSION

Based on the results of the study, it can be concluded that: There is a effectiveness of the use of E-Kalpin as a haemodynamic predictor media in patients with hypertension in reducing the respondents' blood pressure (p-value 0.001). It was also found that the use of questionnaire media in the control group had a relationship in reducing the respondents' blood pressure as a haemodynamic predictor of hypertension patients (p-value 0.043). In addition, it was also found that there was a difference in the average self-management of E-Kalpin 103.93 with a standard deviation of 3.515, while the control group average was 109.07 with a standard deviation of 7.086. The results of the statistical test obtained a p-value of 0.018, meaning that at 5% alpha there was a significant difference in the average of the kalpin group and the control group. This means that the use of E-Kalpin can help people with hypertension in their self-management thus it can be used as a predictor of hemodynamics in daily activities.

As for suggestions from researchers to improve health services to the community, it is hoped that nurses who serve in primary care can use the E-Kalpin application to improve self-management of hypertension patients in order to comply with the treatment program provided. In addition to the development of nursing science, the results of this study can be used as



evidence base for nursing practice in Indonesia.

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